

What is claimed is:

1. An effluent gas treatment apparatus comprising:
a catalytic reactor having an effluent gas inlet and an effluent gas outlet; and
a heater adapted to heat an effluent gas in the catalytic reactor,
whereby effluent gas introduced through the effluent gas inlet is treated while flowing through the catalytic reactor to the effluent gas outlet.
2. An apparatus according to claim 1 wherein the heater is in the catalytic reactor.
3. An apparatus according to claim 1 wherein the heater is within an effluent gas flow path in the catalytic reactor.
4. An apparatus according to claim 1 wherein the heater is adapted to heat the effluent gas to a temperature of at least about 700°C.
5. An apparatus according to claim 1 wherein the catalytic reactor comprises an internal wall adapted to change the direction of the effluent gas flow path in the reactor.
6. An apparatus according to claim 1 further comprising a scrubber capable of scrubbing the effluent gas, the scrubber comprising internal surfaces having a pH of at least about 8.

7. A substrate processing apparatus comprising:

a process chamber comprising a substrate support, a gas supply to introduce a gas into the chamber, a gas energizer to energize the gas to process the substrate and thereby generate an effluent gas, and an exhaust system to exhaust the effluent gas from the chamber;

a catalytic reactor having an effluent gas inlet to receive the effluent gas and an effluent gas outlet; and

a heater adapted to heat effluent gas in the catalytic reactor,

whereby the effluent gas introduced through the effluent gas inlet is treated while flowing through the catalytic reactor to the effluent gas outlet.

8. An apparatus according to claim 7 wherein the heater is in the catalytic reactor.

9. An apparatus according to claim 7 wherein the heater is within an effluent gas flow path in the catalytic reactor.

10. An apparatus according to claim 7 wherein the catalytic reactor comprises an internal wall adapted to change the direction of the effluent gas flow path in the reactor.

11. An apparatus according to claim 10 comprising a plurality of internal walls.

12. An apparatus according to claim 7 further comprising a scrubber capable of scrubbing the effluent gas, the scrubber comprising internal surfaces having a pH of at least about 8.

13. An effluent gas treatment method comprising:

- (a) flowing an effluent gas over a catalyst; and
- (b) during (a), heating the effluent gas.

14. A method according to claim 13 wherein (b) comprises heating the effluent gas to a temperature of at least about 700°C.

15. A method according to claim 13 comprising directing the effluent gas to flow along a convoluted gas flow path while the effluent gas is being heated.

16. A method according to claim 13 further comprising introducing an additive in the effluent gas and wherein (a) comprises catalyzing a reaction in the effluent gas.

17. A method of processing a substrate comprising:

- (a) placing a substrate in a process zone;
- (b) providing an energized gas in a process zone to process the substrate and thereby forming an effluent gas;
- (c) flowing the effluent gas over a catalyst; and
- (d) during (c), heating the effluent gas.

18. A method according to claim 17 wherein (d) comprises heating the effluent gas to at least about 700 °C.

19. A method according to claim 17 comprising flowing the effluent gas along a convoluted gas flow path while the effluent gas is being heated.

20. A method according to claim 17 further comprising introducing an additive in the effluent gas and wherein (c) comprises catalyzing a reaction in the effluent gas.

21. An effluent gas treatment apparatus comprising:
a scrubber capable of treating an effluent gas, the scrubber comprising a surface having a pH of at least about 8;
a heater adapted to heat the effluent gas; and
a catalytic reactor having an effluent gas inlet and an effluent gas outlet,
whereby effluent gas introduced through the effluent gas inlet is treated while flowing through the catalytic reactor to the effluent gas outlet.
22. An apparatus according to claim 21 wherein the surface is on one or more beads.
23. An apparatus according to claim 22 wherein the one or more beads comprise at least about a 3% moisture content.
24. An apparatus according to claim 21 further comprising an additive gas source.
25. A substrate processing method comprising:
(a) placing a substrate in a process zone;
(b) providing an energized gas in a process zone to process the substrate and thereby forming an effluent gas;
(c) passing the effluent gas over a surface having a pH of at least about 8;
(d) flowing the effluent over a catalyst; and
(e) during (d), heating the effluent gas.
26. A method according to claim 25 wherein the surface is on one or more beads.
27. A method according to claim 26 wherein the beads comprise a moisture content of at least about 3%.

28. A method according to claim 25 further comprising introducing an additive into the effluent gas.

29. A substrate processing apparatus comprising:

a process chamber comprising a substrate support, a gas supply to introduce a gas into the chamber, a gas energizer to energize the gas to process the substrate and thereby generate an effluent gas, and an exhaust system to exhaust the effluent gas from the chamber;

a catalytic reactor having an effluent gas inlet to receive the effluent gas and an effluent gas outlet;

a heater adapted to heat the effluent gas in the catalytic reactor; and

a controller adapted to control the heater to heat the effluent gas in the catalytic reactor to a pre-selected temperature,

whereby effluent gas introduced through the effluent gas inlet is heated while flowing through the catalytic reactor to the effluent gas outlet.

30. An apparatus according to claim 29 wherein the heater is in the catalytic reactor.

31. An apparatus according to claim 29 wherein the controller is adapted to control the heater to heat the effluent gas to at least about 700°C.

32. An apparatus according to claim 29 wherein the controller is further adapted to introduce an additive gas into the effluent gas.